2015 Wyoming Grizzly Bear Job Completion Report



BEAR WISE WYOMING

Wyoming Game and Fish Department
Large Carnivore Section

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INTRODUCTION

This completion report summarizes grizzly bear work completed by the Wyoming Game and Fish Department's (Department) Large Carnivore Section (LCS) and regional personnel during 2015. In the past, this information was included in multiple reports that were not readily available to agency personnel, the legislature, or the public. This report allows the Department to present information pertaining to grizzly bears in Wyoming in one cohesive document available to all interested parties.

POPULATION MONITORING – TRAPPING SUMMARY

Annual trapping of grizzly bears by the Department for population monitoring is similar to the annual monitoring programs for other species such as elk or deer. While the methods may differ, the goal is the same; to collect the data necessary to conserve and manage the populations. In addition, data collected during annual monitoring has been extremely useful in answering many important questions regarding the Greater Yellowstone Ecosystem (GYE) grizzly bear population.

Data on grizzly bear survival and reproduction, biological samples, body condition, and collar locations are vital components of the overall population monitoring program. This information provides data necessary to ensure that we can accurately monitor the status of the grizzly bear population and maintain recovery goals for grizzly bears in the GYE.

To maintain a representative sample of the overall population, trapping crews systematically trap areas within known grizzly bear distribution. Trapping locations are chosen annually based on information needs with some instances of opportunistic trapping efforts occurring. Once collars are deployed in a specific area, crews move to another area and trapping continues. This effort occurs through the spring and summer, with trapping ceasing early in the fall to avoid conflicts with ungulate hunting seasons. The following summaries describe trapping efforts for the 2015 season.

Timber Creek

Trapping in Timber Creek began on May 4, 2015. Six trap sites (four culvert, two snare) were set in the area. All traps, baits, scent lures, and other equipment were removed from sites on or before June 12, 2015. Trapping area warning and closure signs were removed on June 17, 2015. Five unique grizzly bears were captured in five capture events, with radio collars placed on three bears (Table 1).

Table 1. Grizzly bears captured during population monitoring efforts in the Timber Creek area, Wyoming, 2015.

Bear ID	Capture Date	Sex/Age	Location	Collar
803	5/07/15	Subadult male	Dick Cr/Timber Cr Divide	VHF collar
809	5/13/15	Adult male	Pitchfork Ranch	GPS collar
810	5/15/15	Adult male	Dick Cr/Timber Cr Divide	GPS collar
G202	5/17/15	Adult male	Franc's Fork	No collar
G203	5/26/15	Adult male	Pitchfork Ranch	No collar

Targhee

Trapping began on June 29, 2015. Ten trap sites (four culvert, six snare) were set in the area. All traps, baits, scent lures, and other equipment were removed from sites on or before July 28, 2015. All trapping area warning and closure signs were removed on August 4, 2015. Bear activity in the area was low overall. Two grizzly bears were captured, both on the south side of the Jackass Meadows Loop Road. Both bears were fitted with radio collars (Table 2).

Table 2. Grizzly bears captured during population monitoring efforts in the Targhee area, Wyoming, 2015.

Bear ID	Capture Date	Sex/Age	Location	Collar
818	7/06/15	Subadult male	Hominy Hill	GPS collar
821	7/22/15	Adult male	Dry Creek	GPS collar

Fox Park

Trapping was conducted from horseback, beginning on August 21, 2015. Four ground snares were set at three trap sites in the Fox Park area outside of Yellowstone National Park. All traps, baits, scent lures, and trapping area warning and closure signs were removed from sites on August 28, 2015. One female grizzly bear with one cub was captured during the trap effort (Table 3).

Table 3. Grizzly bears captured during population monitoring efforts in the Fox Park area, Wyoming, 2015.

Bear ID	Capture Date	Sex/Age	Location	Collar
831	8/25/15	Adult female	Plateau Cr.	GPS collar

MONITORING – GRIZZLY BEAR OBSERVATION FLIGHTS

The Department, along with other member agencies of the Interagency Grizzly Bear Study Team (IGBST), conducts observation flights in order to monitor the Greater Yellowstone grizzly bear population and estimate abundance. In 2015, the Grizzly Bear Observation Units (GBOUs) in the southern portion of the GYE (Figure 1) were only flown once due to efforts to reduce flight time and the low sightability of grizzly bears in these areas. Flights were conducted in June to maximize the potential for observations in these units. One exception to this were GBOUs 26A and 26B, which were flown once in June and once in July due to higher numbers of grizzly bears in these areas. The remaining GBOUs in the northern GYE were flown twice, once each in July and August. There were fewer grizzly bear observations during 2015 Round 1 (including June flights) than in 2014, with 178 total grizzly bears observed in the Wyoming GBOUs compared to 224 in 2014. The number of females with cubs-of-year (Fcoy) groups observed in 2015 Round 1 was also lower than 2014, with 17 observed compared to 23 in 2014 (Table 4).

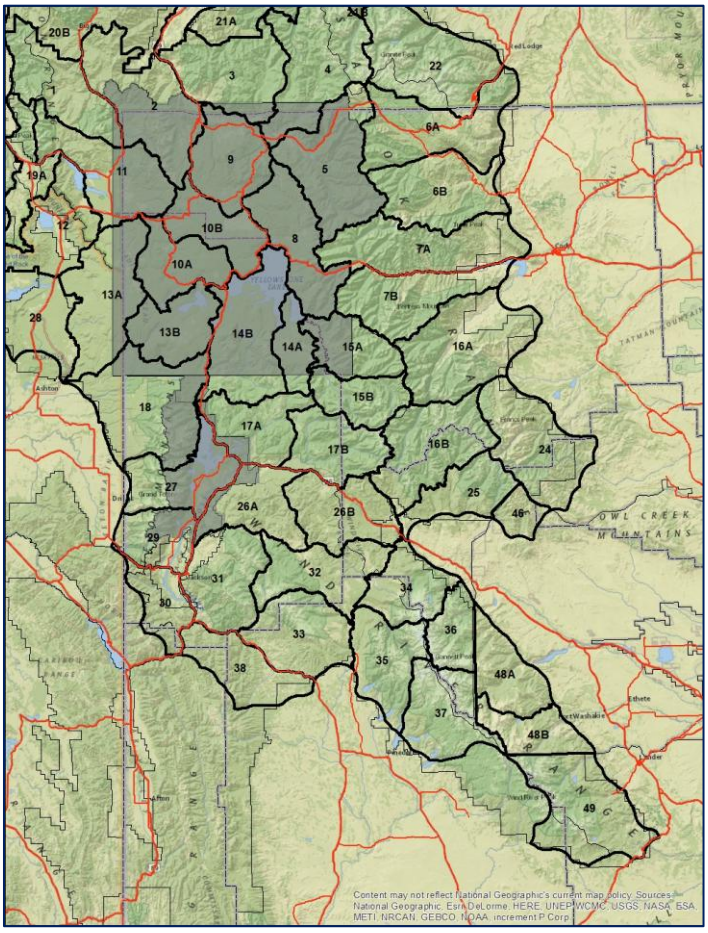


Figure 1. Grizzly Bear Observation Units (GBOUs) in the Wyoming portion of the Greater Yellowstone Ecosystem.

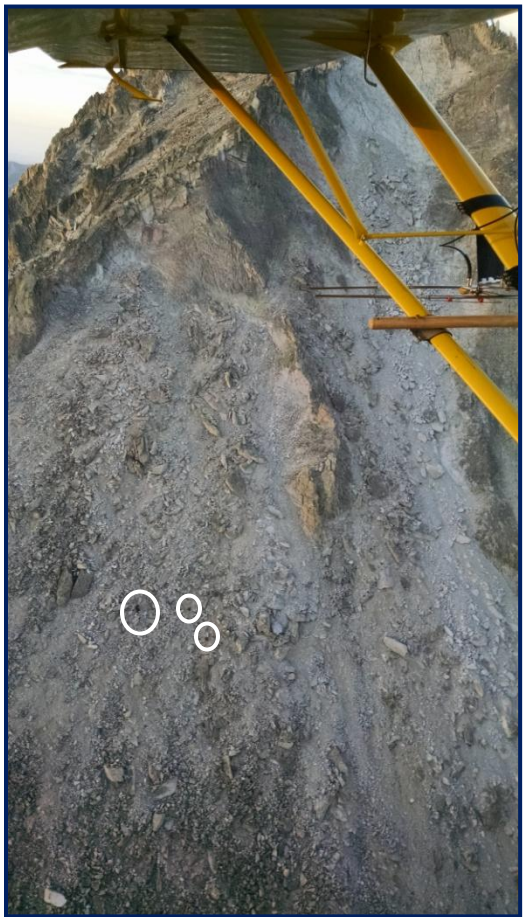
Table 4. Composition of grizzly bears observed in Round 1 during 2015 observation surveys in Wyoming.

		Females with COY			Females with Yearlings			Females with 2 Year Olds					
		# of COY			# of Yrlngs			# of 2 Yr Olds				All Other Grizzly	Total No. Bears
Date	Unit	1	2	3	1	2	3	1	2	3	4	Bears	Observed
7/12	6A	0	0	0	0	0	0	0	0	0	0	0	0
7/10	6B	0	0	1	0	1	0	0	0	0	0	2	9
7/12	7A	1	0	0	1	1	0	0	0	0	0	9	16
7/19	7B	0	2	0	0	1	0	0	0	0	0	10	19
7/8	15A	0	1	1	0	0	0	0	0	0	0	1	8
7/9	15B	1	0	1	0	1	0	0	0	0	0	5	14
7/14	16A	0	1	1	0	1	0	0	0	0	0	13	23
7/15	16B	2	0	0	1	3	1	0	0	0	0	11	30
7/17	17A	0	1	0	0	0	0	0	0	0	0	4	7
7/18	17B	0	0	0	0	0	0	0	0	0	0	5	5
7/13	24	0	2	1	0	1	0	0	0	0	0	26	39
7/16	25	0	1	0	0	0	0	0	0	0	0	1	4
6/11	26A	0	0	0	0	0	0	0	0	0	0	1	1
6/10	26B	0	0	0	0	0	0	0	0	0	0	1	1
6/20	29	0	0	0	0	0	0	0	0	0	0	0	0
6/12	30	0	0	0	0	0	0	0	0	0	0	0	0
6/15	31	0	0	0	0	0	0	0	0	0	0	0	0
6/20	32	0	0	0	0	0	0	0	0	0	0	0	0
6/18	33	0	0	0	0	0	0	0	0	0	0	0	0
6/17	34	0	0	0	0	0	0	0	0	0	0	2	2
6/16	35	0	0	0	0	0	0	0	0	0	0	0	0
6/19	36	0	0	0	0	0	0	0	0	0	0	0	0
6/16	37	0	0	0	0	0	0	0	0	0	0	0	0
All Areas		4	8	5	2	9	1	0	0	0	0	91	178

Only the northern GBOUs were flown during the second round of flights, with the exception of GBOUs 26A and 26B. As is normally the case, the number of grizzly bears observed in Round 2 was higher than in Round 1. Peak grizzly bear use of army cutworm moth sites usually occurs during Round 2. However, compared to 2014, the number of grizzly bears observed decreased to 200 in 2015 from 300 the previous year. Much of this decrease was attributable to fewer grizzly bears observed on army cutworm moth sites in 2015, likely due to low numbers of moths in many of these areas. Fifteen females with cubs-of-the-year were observed during Round 2 flights compared to 22 in 2014 (Table 5).

Table 5. Composition of grizzly bears observed in Round 2 during 2015 observation surveys in Wyoming.

		Females with COY			Females with Yearlings			Females with 2 Year Olds				All Other Grizzly Bears	Total No. Bears Observed
		# of COY			# of Yrlngs			# of 2 Yr Olds					
Date	Unit	1	2	3	1	2	3	1	2	3	4		
7/12	6A	0	0	0	0	0	0	0	0	0	0	0	0
7/10	6B	0	1	0	0	0	0	0	0	0	0	4	7
7/12	7A	1	0	0	0	3	0	0	0	0	0	7	18
7/19	7B	0	1	0	0	1	0	0	0	0	0	17	23
7/8	15A	0	0	0	0	0	0	0	0	0	0	1	1
7/9	15B	0	0	0	0	0	0	0	0	0	0	2	2
7/14	16A	0	3	0	0	3	0	0	0	0	0	24	42
7/15	16B	3	1	0	2	2	1	0	0	0	0	18	41
7/17	17A	0	0	0	0	0	0	0	0	0	0	0	0
7/18	17B	0	0	0	0	1	0	0	0	0	0	4	7
7/13	24	0	4	1	0	0	1	0	0	0	0	30	50
7/16	25	0	0	0	0	0	0	0	0	0	0	1	1
6/11	26A	0	0	0	0	1	0	0	0	0	0	0	3
6/10	26B	0	0	0	0	0	0	0	0	0	1	0	5
All Areas		4	10	1	2	11	2	0	0	0	1	108	200



Female grizzly bear with two cubs-of-the-year feeding on a moth site.

MONITORING – MOTH SITE USE BY GRIZZLY BEARS

Taken from*: Grizzly Bear Use of Insect Aggregation Sites Documented from Aerial Telemetry and Observations* *(Dan Bjornlie, Wyoming Game and Fish Department; and Mark Haroldson, Interagency Grizzly Bear Study Team)*

Army cutworm moths (*Euxoa auxiliaris*) were first recognized as an important food source for grizzly bears in the GYE during the mid 1980s (Mattson et al. 1991*b*, French et al. 1994). Early observations indicated that moths, and subsequently bears, showed specific site fidelity. These sites are generally high alpine areas dominated by talus and scree adjacent to areas with abundant alpine flowers. Because insects other than army cutworm moths may be present and consumed by bears (e.g., ladybird beetles [Coccinellidae family]), we generally refer to such areas as "insect aggregation sites." Within the GYE, observations indicate army cutworm moths are the primary food source at these sites.

Since their discovery, numerous bears have been counted on or near these aggregation sites due to excellent sightability from a lack of trees and simultaneous use by multiple bears. However, complete tabulation of grizzly presence at insect sites is extremely difficult. Only a few sites have been investigated by ground reconnaissance and the boundaries of sites are not clearly known. In addition, it is likely that the size and location of aggregation sites fluctuate from year to year with moth abundance and variation in environmental factors such as snow cover.

Since 1986, when insect aggregation sites were initially included in aerial observation surveys, our knowledge of these sites has increased annually. Our techniques for monitoring grizzly bear use of these sites have changed in response to this increase in knowledge. Prior to 1997, we delineated insect aggregation sites with convex polygons drawn around locations of bears seen feeding on moths and buffered these polygons by 500 m. However, this technique overlooked small sites due to the inability to create polygons around sites with fewer than three locations. During1997–1999, the method for defining insect aggregation sites was to inscribe a 1-km circle around the center of clusters of observations in which bears were seen feeding on insects in talus/scree habitats (Ternent and Haroldson 2000). This method allowed trend in bear use of sites to be annually monitored by recording the number of bears documented in each circle (site).

We developed a new technique in 2000 (D. Bjornlie, Wyoming Game and Fish Department, personal communication) that delineates sites by buffering only the locations of bears observed actively feeding at insect aggregation sites by 500 m; this distance was used to account for error in aerial telemetry locations. The borders of the overlapping buffers at individual insect sites are dissolved to produce a single polygon for each site. These sites are identified as "confirmed" sites. Because these polygons are only created around feeding locations, the resulting site conforms to the topography of the mountain or ridge top where bears feed and does not include large areas of non-talus habitat that are not suitable for cutworm moths. Locations from the grizzly bear location database from July 1 through September 30 of each year are then overlaid on these polygons and enumerated. This new technique substantially decreased the number of sites described in prior years, in which locations from both feeding and non-feeding bears were used. Therefore, we use this technique for the annual analysis completed for all years. Areas suspected as insect aggregation sites but dropped from the list of confirmed sites using this

technique, and sites with only one observation of an actively feeding bear or multiple observations in a single year, are termed "possible" sites and will be monitored in subsequent years for additional observations of actively feeding bears. These sites may then be added to the confirmed sites list. When possible sites are changed to confirmed sites, analysis is done on all data back to 1986 to determine the historic use of that site. Therefore, the number of bears using insect aggregation sites in past years may change as new sites are added, and data from this annual report may not match that of past reports. In addition, as new actively feeding bear observations are added along the periphery of existing sites, the polygons defining these sites increase in size and, thus, more overlaid locations fall within the site. This retrospective analysis brings us closer each year to the "true" number of bears using insect aggregation sites in past years.

Analysis of grizzly bear use of confirmed sites in 2015 resulted in the merging of two previously separate confirmed sites into one confirmed site as site boundaries grew together. Also, an additional observation of actively feeding grizzly bears on a nearby possible site led to this site being merged with sites above. There were no observations of actively feeding grizzly bears at previously undocumented sites and therefore, there were no new possible sites added in 2015. The new confirmed site, and merging the two previously-confirmed sites, produced 30 confirmed sites and 14 possible sites for 2015.

Overall insect aggregation site use by grizzly bears decreased in 2015 (n = 222) compared to the increasing trend for years 2010-2014 (Table 6). The number of grizzly bears observed on sites and the percentage of confirmed sites with documented use by grizzly bears varies from year to year, suggesting that some years have higher moth activity than others (Figure 2), which may be due to variable snow conditions or the number of moths migrating from the plains. In 1993, a year with unusually high snowpack, the percentage of confirmed sites used by bears (Figure 2) and the number of observations recorded at insect sites (Table 6) were very low. In all other years, the percentage of insect aggregation sites used by grizzly bears fluctuated between 50 and 80% and in 2015 remained above 70% for the third consecutive year (Figure 2).

The decrease in use of insect aggregation sites by grizzly bears in 2015 is also apparent when only bears observed during regularly-conducted observation flights are included (Figure 3). Because effort, as measured by hours flown, in the bear management units containing all known insect aggregation sites has remained consistent since 1997, the change in the number of grizzly bears using insect aggregation sites suggests this decrease was not due to change in observation effort (Figure 3). The increase in reported observations of grizzly bears using insect aggregation sites from ground-based observers and our increased use of GPS collars with satellite technology has resulted in the need to censor these locations to prevent a bias in comparisons with previous years. Therefore, the number of aerial telemetry relocations and observations from Table 6 reflect this change and may differ from previous annual reports.

Table 6. The number of confirmed insect aggregation sites in the Greater Yellowstone Ecosystem annually, the number used by bears, and the total number of aerial telemetry relocations and ground or aerial observations of bears recorded at sites during 1986–2015.

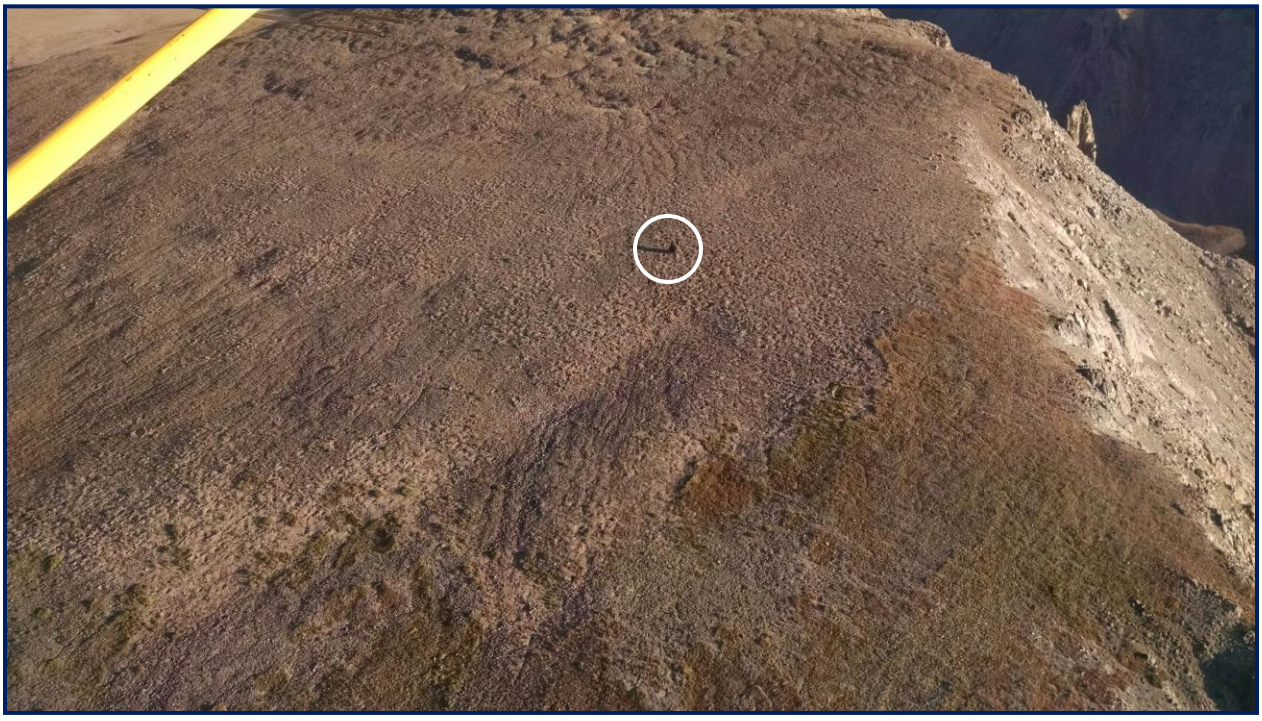
Year	Number of confirmed moth sites[a]	Number of sites used[b]	Number of aerial telemetry relocations	Number of aerial observations
1986	4	2	6	5
1987	5	3	3	11
1988	5	3	11	28
1989	9	7	9	41
1990	14	11	9	77
1991	16	12	12	168
1992	17	11	6	104
1993	18	3	1	2
1994	18	9	1	30
1995	20	11	7	38
1996	21	14	21	67
1997	22	15	17	83
1998	25	21	10	182
1999	25	14	25	156
2000	25	13	47	95
2001	26	18	23	127
2002	27	20	30	251
2003	27	20	9	163
2004	27	16	2	134
2005	29	19	16	193
2006	29	16	14	146
2007	29	19	19	160
2008	29	22	15	178
2009	30	22	6	169
2010	30	18	2	132
2011	30	19	9	159
2012	30	22	16	252
2013	30	22	25	294
2014	30	23	11	342
2015	30	21	13	209
Total			395	3996

[a] The year of discovery was considered the first year a telemetry location or aerial observation was documented at a site. Sites were considered confirmed after additional locations or observations in a subsequent year and every year thereafter regardless of whether or not additional locations were documented.

[b] A site was considered used if ≥1 location or observation was documented within the site during July through September of that year.

The IGBST maintains an annual list of unique females observed with cubs. Since 1986, 1,061 initial sightings of unique females with cubs have been recorded, of which 298 (28.1%) have occurred at (<500 m, *n* = 280) or near (<1,500 m, *n* = 18) insect aggregation sites (Table 7). In 2015, 11 of the 46 (23.9%) initial sightings of unique females with cubs were observed at insect aggregation sites; slightly below the mean of 25.7% for the previous five years, 2010–2014 (Table 7).

Survey flights at or near (<1,500 m) insect aggregation sites contribute to the count of unique females with cubs; however, it is typically low, with a 10-year mean of 11.9 initial sightings/year since 2006 (Table 7). If these sightings are excluded, a similar trend in the annual number of unique sightings of females with cubs is still evident (Figure 4), suggesting that other factors besides observation effort at insect aggregation sites are responsible for the increase in sightings of females with cubs.



A lone grizzly bear feeding on the Buffalo Plateau in northwest Wyoming.

Table 7. Number of initial sightings of unique females with cubs that occurred on or near insect aggregation sites, number of sites where such sightings were documented, and the mean number of sightings per site in the Greater Yellowstone Ecosystem, 1986–2015.

	Unique females with cubs[a]	Number of moth sites with an initial sighting[b]	Initial sightings			
			Within 500 m[b]		Within 1,500 m[c]	
				%		%
1986	25	0	0	*0.0*	0	*0.0*
1987	13	0	0	*0.0*	0	*0.0*
1988	19	1	2	*10.5*	2	*10.5*
1989	16	1	1	*6.3*	1	*6.3*
1990	25	4	4	*16.0*	5	*20.0*
1991	24	7	13	*54.2*	14	*58.3*
1992	25	5	7	*28.0*	9	*36.0*
1993	20	1	1	*5.0*	1	*5.0*
1994	20	3	5	*25.0*	5	*25.0*
1995	17	2	2	*11.8*	2	*11.8*
1996	33	7	7	*21.2*	8	*24.2*
1997	31	8	11	*35.5*	11	*35.5*
1998	35	10	13	*37.1*	13	*37.1*
1999	33	3	6	*18.2*	7	*21.2*
2000	37	6	9	*24.3*	10	*27.0*
2001	42	7	13	*31.0*	13	*31.0*
2002	52	11	18	*34.6*	18	*34.6*
2003	38	11	20	*52.6*	20	*52.6*
2004	49	11	17	*34.7*	17	*34.7*
2005	31	5	7	*22.6*	8	*25.8*
2006	47	11	15	*31.9*	16	*34.0*
2007	50	10	17	*34.0*	17	*34.0*
2008	44	7	11	*25.0*	14	*31.8*
2009	42	4	6	*14.3*	7	*16.7*
2010	51	7	9	*17.6*	9	*17.6*
2011	39	6	7	*17.9*	7	*17.9*
2012	49	6	13	*26.5*	13	*26.5*
2013	58	8	14	*24.1*	15	*25.9*
2014	50	11	21	*42.0*	23	*46.0*
2015	46	7	11	*23.9*	13	*28.3*
Total	1061		280		298	
Mean	35.4	6.0	9.3	24.2	9.9	25.8

[a] Initial sightings of unique females with cubs; see Table 5.

[b] Insect aggregation site is defined as a 500-m buffer drawn around a cluster of observations of bears actively feeding.

[c] This distance is 3 times what is defined as an insect aggregation site for this analysis, since some observations could be made of bears traveling to and from insect aggregation sites.

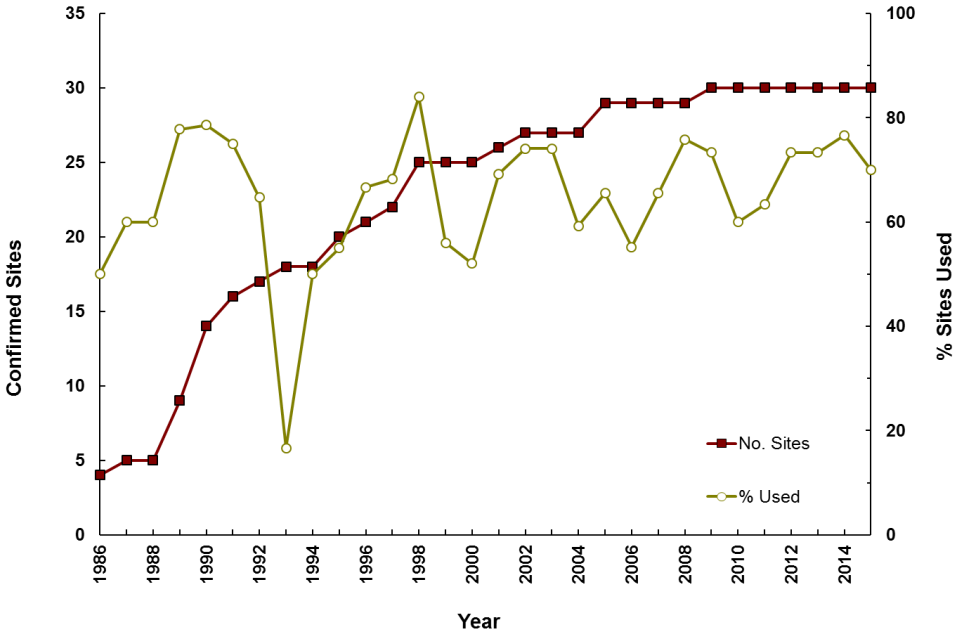


Figure 2. Annual number of confirmed insect aggregation sites and percent of those sites at which either telemetry relocations of marked bears or visual observations of unmarked bears were recorded, Greater Yellowstone Ecosystem, 1986–2015.

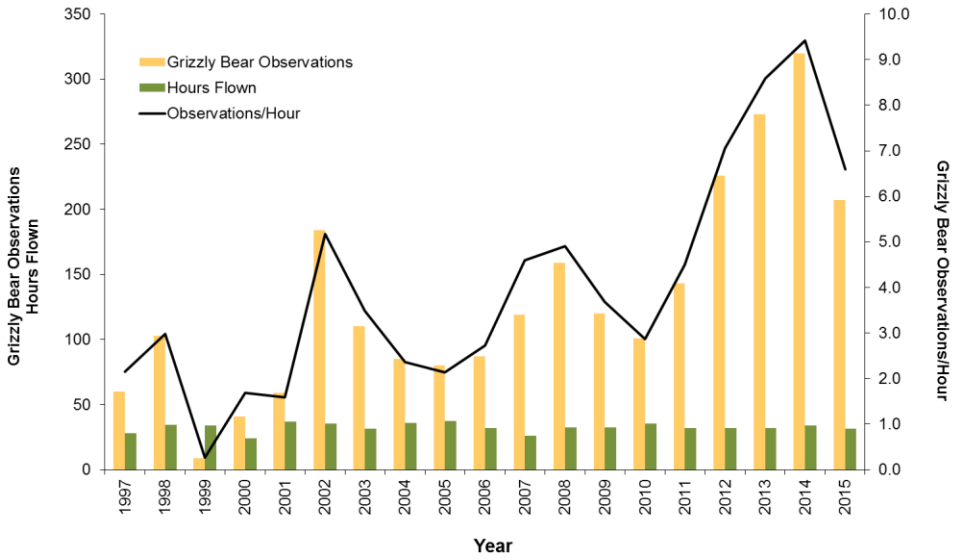


Figure 3. The number of grizzly bears observed (tan bars) on insect aggregation sites during observation flights only, hours flown (green bars) for these bear management units (BMU), and grizzly bear observations per hour (black line) during observation flights of BMUs containing all known insect aggregation sites, Greater Yellowstone Ecosystem, 1997–2015.

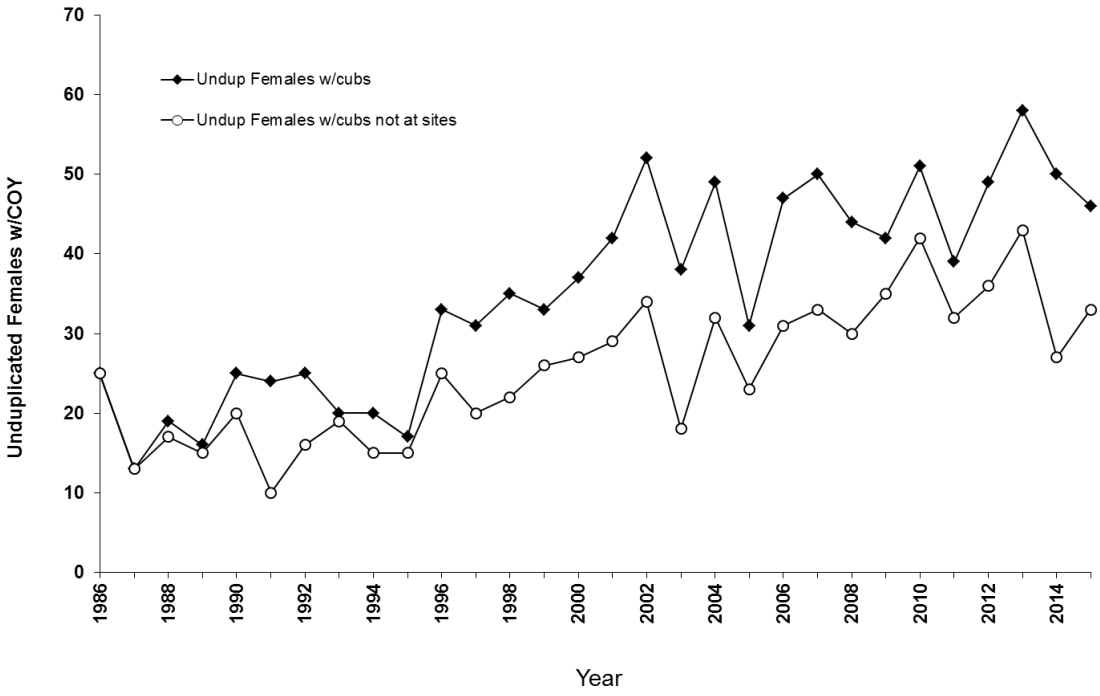


Figure 4. The total number of unique females with cubs observed annually in the Greater Yellowstone Ecosystem and the number of unique females with cubs *not* found within 1,500 m of known insect aggregation sites, 1986–2015.

Grizzly bear family group feeding on insect aggregation sites

RELEVANT PUBLICATIONS

Personnel with the Department's Large Carnivore Section were authors and/or collaborators of multiple peer-reviewed research papers on grizzly bear ecology in the past few years. Some of these abstracts were included in the 2014 Grizzly Bear JCR, however were technically published during this year's reporting period and are therefore included here. These publications are examples of peer reviewed for the GYE grizzly bear population and are essential in demonstrating the recovery of the population.

The primary link to other publications, annual reports, and peer reviewed literature for the Yellowstone population of grizzly bears is summarized on the United States Geological Service web site at http://www.nrmsc.usgs.gov/products/IGBST. For information specific to the Wyoming Game and Fish Department's grizzly bear management program; including links to publications, reports, updates, and plan visit: https://wgfd.wyo.gov/web2011/wildlife-1000674.aspx.

Whitebark pine, population density, and home-range size of grizzly bears in the Greater Yellowstone Ecosystem

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Changes in life history traits of species can be an important indicator of potential factors influencing populations. For grizzly bears (*Ursus arctos*) in the Greater Yellowstone Ecosystem (GYE), recent decline of whitebark pine (WBP; *Pinus albicaulis*), an important fall food resource, has been paired with a slowing of population growth following two decades of robust population increase. These observations have raised questions whether resource decline or density-dependent processes may be associated with changes in population growth. Distinguishing these effects based on changes in demographic rates can be difficult. However, unlike the parallel demographic responses expected from both decreasing food availability and increasing population density, we hypothesized opposing behavioral responses of grizzly bears with regard to changes in home-range size. We used the dynamic changes in food resources and population density of grizzly bears as a natural experiment to examine hypotheses regarding these potentially competing influences on grizzly bear home-range size. We found that home-range size did not increase during the period of whitebark pine decline and was not related to proportion of whitebark pine in home ranges. However, female home-range size was negatively associated with an index of population density. Our data indicate that home-range size of grizzly bears in the GYE is not associated with availability of WBP, and, for female grizzly bears, increasing population density may constrain home-range size.

PlosOne 9(2): e88160. (doi:10.1371/journal.pone.0088160).

Multiple estimates of effective population size for monitoring a long-lived vertebrate: An application to Yellowstone grizzly bears

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ABSTRACT Effective population size (N_e) is a key parameter for monitoring the genetic health of threatened populations because it reflects a population's evolutionary potential and risk of extinction due to genetic stochasticity. However, its application to wildlife monitoring has been limited because it is difficult to measure in natural populations. The isolated and well-studied population of grizzly bears (*Ursus arctos*) in the Greater Yellowstone Ecosystem provides a rare opportunity to examine the usefulness of different N_e estimators for monitoring. We genotyped 729 Yellowstone grizzly bears using 20 microsatellites and applied three single-sample estimators to examine contemporary trends in generation interval (GI), effective number of breeders (N_b) and N_e during 1982–2007. We also used multisample methods to estimate variance (N_{eV}) and inbreeding N_e (N_{eI}). Single-sample estimates revealed positive trajectories, with over a fourfold increase in N_e (≈100 to 450) and near doubling of the GI (≈8 to 14) from the 1980s to 2000s. N_{eV} (240–319) and N_{eI} (256) were comparable with the harmonic mean single-sample N_e (213) over the time period. Reanalysing historical data, we found N_{eV} increased from ≈80 in the 1910s–1960s to ≈280 in the contemporary population. The estimated ratio of effective to total census size (N_e/N_c) was stable and high (0.42–0.66) compared to previous brown bear studies. These results support independent demographic evidence for Yellowstone grizzly bear population growth since the 1980s. They further demonstrate how genetic monitoring of N_e can complement demographic-based monitoring of N_c and vital rates, providing a valuable tool for wildlife managers.

Molecular Ecology Volume 24, Issue 22: Pages 5507-5521.

Detecting grizzly bear use of ungulate carcasses using global positioning system telemetry and activity data

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ABSTRACT Global positioning system (GPS) wildlife collars have revolutionized wildlife research. Studies of predation by free-ranging carnivores have particularly benefited from the application of location clustering algorithms to determine when and where predation events occur. These studies have changed our understanding of large carnivore behavior, but the gains have concentrated on obligate carnivores. Facultative carnivores, such as grizzly/brown bears (*Ursus arctos*), exhibit a variety of behaviors that can lead to the formation of GPS clusters. We combined clustering techniques with field site investigations of grizzly bear GPS locations (n = 732 site investigations; 2004–2011) to produce 174 GPS clusters where documented behavior was partitioned into five classes (large-biomass carcass, small-biomass carcass, old carcass, non-carcass activity, and resting). We used multinomial logistic regression to predict the probability of clusters belonging to each class. Two cross-validation methods—leaving out individual clusters, or leaving out individual bears—showed that correct prediction of bear visitation to large-biomass carcasses was 78–88 %, whereas the false-positive rate was 18–24 %. As a case study, we applied our predictive model to a GPS data set of 266 bear-years in the Greater Yellowstone Ecosystem (2002–2011) and examined trends in carcass visitation during fall hyperphagia (September–October). We identified 1997 spatial GPS clusters, of which 347 were predicted to be large-biomass carcasses. We used the clustered data to develop a carcass visitation index, which varied annually, but more than doubled during the study period. Our study demonstrates the effectiveness and utility of identifying GPS clusters associated with carcass visitation by a facultative carnivore.

Oecologia, Volume 181, Issue 3: pages 695-708

	ENDANGERED SPECIES **SECTION 6 FUNDING** **PROGRAM NARRATIVE STATEMENT PROPOSAL** **WYOMING** **E-1-99**

Title:	Grizzly Bear Recovery and Conservation
Total Cost:	$100,000 ($75,000 USFWS and $25,000 WGFD match) - This includes temporary personnel, salaries, supplies, travel, surveys, and education efforts.
Time Period:	July 1, 2016 – June 30, 2017
Project Leader:	Daniel Thompson, Large Carnivore Section Supervisor 260 Buena Vista Dr., Lander, WY 82520 Dustin Lasseter, Bear Wise Community Coordinator 2820 State Hwy, 120, Cody, WY 82414
Location:	The program area encompasses all areas within the state of Wyoming in the Yellowstone Ecosystem outside of Yellowstone and Grand Teton National Parks. Additional activities may be completed within Yellowstone and Grand Teton National Parks in conjunction with the National Parks. Coordination also occurs between the WGFD and appropriate National Forests, Bureau of Land Management, U.S. Fish and Wildlife Service, and state lands as required.
Need:	The Department's grizzly bear program involves monitoring and management projects designed to determine various population characteristics and habitat use of grizzly bears in the Wyoming portion of the GYE, and to manage grizzly bear/livestock and grizzly bear/human interactions. Management programs are directed towards monitoring the grizzly bear population trend through observation flights that define the distribution of grizzly bears within bear management units (BMUs), document females with cubs of the year, and allow for detailed monitoring of radio-collared individuals to assess important movement, seasonal habitat use, food selection, and survival estimates. Due to the long-lived, wide-ranging characteristics of grizzly bears, adequate information is needed for sound management decisions. Additional data will be needed to show trends in grizzly bear activities associated with road construction, timber management, mineral development, and cattle grazing in the southern BMUs, especially in areas outside the recovery area which are presently occupied by grizzly bears.

	The state currently funds one seasonal wildlife biologist; however, additional funds are requested for 1 additional person to assist in trapping grizzly bears and conducting surveys to document distribution and expansion of the population into the Wyoming Range and the southern portions of the Wind River Range. The state will fund the necessary training, supplies, travel, vehicles, and other associated equipment for these positions. Priority conflict efforts include responding to all bear conflict complaints. All known mortalities are investigated in cooperation with the U.S. Fish and Wildlife Service-Law Enforcement. Bears involved in conflicts will be captured, relocated, or removed as required. Grizzly bear/human conflict management will continue to be a high priority during recovery and management of the Yellowstone area grizzly bear population. Conflict management is essential to reducing human caused bear mortalities and maintaining public support of recovery efforts. Section 6 funds are needed to assist with local public awareness of bear safety and conflict prevention issues. In addition the Department has been instrumental in developing a carcass management program that removes significant threats of grizzly bear conflicts by taking livestock carcasses out of occupied grizzly bear range. Section 6 funding has previously been used to offset some of the costs for radio collars and aerial surveys, including telemetry flights to determine grizzly bear locations. Without section 6 funding, manpower, population and habitat data collection, and response rates to manage nuisance grizzly bears would be decreased. Previous allocations of Section 6 funds have not adequately covered the costs of the above items, which may hinder data collection to assure that monitoring is completed as described in the Yellowstone Grizzly Bear Conservation Strategy (CS). Additional funds are required to assure that aerial relocation schedules can be maintained and that we can deal with an increasing distribution of grizzly bears and grizzly bear conflicts on the landscape. Information and Educational (I&E) efforts are essential to the recovery of grizzly bears in the Greater Yellowstone Ecosystem in order to maintain and attempt to build public tolerance for grizzly bears, especially in areas of expansion. Monies obtained from Section 6 funding will also be used for these I&E purposes as well as proactive awareness programs to reduce the potential for serious human/grizzly bear conflicts. The Department has implemented a Bear Wise Wyoming program that serves as a proactive outreach program to educate the public and provide information and experience to decrease the potential for conflicts between grizzly bears and humans. These efforts are necessary for the long term perpetuity of maintaining grizzly bears on the landscape and for building public tolerance of the species where bears are potentially causing conflicts
Objectives:	1) Assist the Interagency Grizzly Bear Study Team (IGBST) in determining food habits, habitat use, distribution, population trend, allowable mortality

	thresholds, and other important parameters for grizzly bears within the southern BMUs, 2) Provide comparative data to that already gathered by the IGBST, Idaho, and Montana, 3) Manage bear/human interaction, bear/livestock interaction and mortality data specific for each BMU to aid state and federal managers in minimizing human caused mortalities and grizzly bear conflicts. 4) Continue to provide important information and educational efforts to assist with bear conservation and safety issues, distribute information to hunters and other publics on bear safety, support a section on "Hunting in Bear Country" in statewide Hunter Education efforts, and continue to conduct numerous workshops on how to live safely in areas occupied by bears.
Approach:	1) <u>Trapping and Handling</u> Bears will be captured using Aldrich foot snares and trailer mounted box traps. Each animal will be ear tagged, lip tattooed for later identification, and fitted with a radio-collar. All collars are modified to fall off within 2 years using cotton spacers. Research-trapping efforts for grizzly bears are to be conducted on the Shoshone (SNF) and Bridger Teton (BTNF) National Forests, as well as BLM and private lands, as required. Trapping schedules are developed jointly with the IGBST to assure adequate coverage outside the National Parks so that sampling and home range analysis corresponds to known grizzly bear distribution. 2) <u>Telemetry and Home Range Analysis</u> Bear locations will be determined using fixed wing aircraft, along with intensive sampling from the ground. The home ranges of collared animals will be calculated using the Harmonic Mean method. 3) <u>Grizzly Bear/Livestock Interactions</u> Grizzly Bear/livestock interactions will be managed as per the "Interagency Grizzly Bear Guidelines" and appropriate state and Federal laws and regulations. 4) <u>Annual Data Collection</u> Locations of radio-collared grizzly bears will be monitored with aerial flights. Cattle carcasses in the study area will also be investigated to determine cause of death. Detailed biological and physiological data will be gathered on each bear captured. 5) <u>Grizzly Bear/Human Interactions</u>

	The Department will continue to evaluate all bear/human interactions and take appropriate management actions in accordance with "Interagency Grizzly Bear Guidelines". 6) Multi-Agency Effort The CS has objectives for data collection to assure that the population status and other indices to recovery can be annually assessed for this population. This requires that several agencies work cooperatively to meet these goals. As a result, the states of Idaho, Montana, and Wyoming along with several federal agencies, share in the data collection and analysis of that data. All of the affected agencies, both state and federal, have signed the CS and have committed to collecting the information necessary to manage this population into the future.
Expected Results:	A primary goal of this program is to capture and radio-collar grizzly bears to provide an even distribution of marked grizzly bears and to enhance annual life history data of grizzly bears occupying new regions of the GYE. Without this data, survival rates by age and sex will be compromised as data will only be available from a portion of the ecosystem. Observation flights are a key component of the annual data collection scheme. Section 6 funding would assure that adequate coverage of all occupied habitat is surveyed. New techniques may be investigated as warranted to test timing and frequency of these flights as well as testing the efficacy of new techniques such as the use of aerial imagery. Results would assist in providing a more accurate estimate of females with cubs of the year that is used to establish the population estimate. These funds will assure that data collection is consistent across the entire ecosystem, which is required to accurately assess the status of several population parameters. These funds will also assure that conflicts between grizzly bears and humans will be managed in a timely and consistent process. The number of conflicts continues to increase in Wyoming's portion of the ecosystem. Section 6 funds would be used to make sure personnel can effectively and efficiently respond to conflict situations in a timely and safe fashion. With additional funding, the Department's I&E efforts can be increased to assure that larger segments of the public are contacted to increase their awareness of how to recreate and live in occupied grizzly bear habitat.

GRIZZLY BEAR CONFLICT MANAGEMENT

Introduction

Human-grizzly bear interactions and conflicts in Wyoming are typically a result of grizzly bears seeking unnatural foods in association with people and property, close encounters with humans, or when grizzly bears kill livestock. The number and location of human-bear conflicts is influenced by unsecured unnatural attractants (e.g. human foods and garbage), natural food distribution and abundance, grizzly bear numbers and distribution, and human and livestock use patterns on the landscape.

The management technique of capturing grizzly bears in areas where they may come into conflict with people and relocating them to remote locations is a common practice throughout the world. Relocating bears achieves several social and conservation functions: (a) reduces the chance of property damage, livestock damage, or human interactions in areas where the potential for conflict is high; (b) reduces the potential for grizzly bears to become food conditioned and/or human habituated which often results in destructive and/or dangerous behaviors; (c) allows grizzly bears the opportunity to forage on natural foods and remain wary of people; and (d) could prevent removing grizzly bears from the population which may be beneficial in meeting population management objectives.

The Department relocates and removes black and grizzly bears as part of routine management operations. The decision to relocate or remove a bear is made after considering a number of variables including age and sex of the animal, behavioral traits, health status, physical injuries or abnormalities, type of conflict, severity of conflict, known history of the animal, human safety concerns, and population management objectives. Grizzly bears are relocated in accordance with state and federal law, regulation, and policy.

In 2005 the Wyoming Legislature created Wyoming Statute §23-1-1001 as follows:

> (a) Upon relocating a grizzly bear or upon receiving notification that a grizzly bear is being relocated, the department shall provide notification to the county sheriff of the county to which the grizzly bear is relocated within five (5) days of each grizzly bear relocation and shall issue a press release to the media and sheriff in the county where each grizzly bear is relocated;
>
> (b) The notice and press release shall provide the following information:
>
> (i) The date of the grizzly bear relocation;
> (ii) The number of grizzly bears relocated; and
> (iii) The location of the grizzly bear relocation, as provided by commission rule and regulation;
>
> (c) No later than January 15 of each year the department shall submit an annual report to the Joint Travel, Recreation, Wildlife, and Cultural Resources Interim committee. The annual report shall include the total number and relocation area of each grizzly bear relocated during

the previous calendar year. The department shall also make available the annual report to the public.

Subsequently, the Wyoming Game and Fish Commission promulgated Chapter 58 to further direct the implementation of W.S. §23-1-1001 as follows:

Section 1. Authority. This regulation is promulgated by authority of W.S. §23-1-1001.

Section 2. Regulation. The Wyoming Game and Fish Commission hereby adopts the following regulation governing notification to the County Sheriff and the media of grizzly bear relocations in the State of Wyoming. This regulation shall remain in effect until modified or rescinded by the Commission.

Section 3. Definitions. For the purpose of this regulation, definitions shall be as set forth in Title 23, Wyoming Statutes and the Commission also adopts the following definitions:

(a) "County Sheriff" means the County Sheriff's Office in the county where a grizzly bear is relocated.

(b) "Location of the grizzly bear relocation" means the proper name of the drainage in which a grizzly bear is relocated and the estimated number of miles from the relocation site to the nearest municipality, topographical feature or geographic location.

(c) "Provide a press release" means the department shall provide to the County Sheriff and the media in the county in which a grizzly bear is relocated, a press release including the location of the grizzly bear relocation, number of grizzly bears relocated, date of the relocation and the reason the grizzly bear was relocated.

Section 4. Notification of relocation.

(a) Upon relocating a grizzly bear or upon receiving notification that a grizzly bear is being relocated, the department shall notify the County Sheriff of the date, number of grizzly bears relocated, the location of the grizzly bear relocation and the reason of the relocation via direct telephone conversation, written or electronic correspondence, or personal contact within five (5) days of the date of the relocation. The department shall provide a press release to the County Sheriff and the media in the county where a grizzly bear is relocated of the date, number of grizzly bears relocated, the location of the grizzly bear relocation and the reason of the relocation within five (5) days of the date of relocation of any grizzly bear.

Section 5. Savings Clause. If any provision of this regulation is held to be illegal or unconstitutional, such a ruling shall not affect other provisions of this regulation which can be given effect without the illegal or unconstitutional provision; and, to this end the provisions of this regulation are severable.

WYOMING GAME AND FISH COMMISSION
By: Linda Fleming, President
Dated: July 12, 2005

CONFLICT MANAGEMENT – CAPTURES, HANDLING AND RELOCATION

During 2015, Department personnel captured 45 grizzly bears in 51 capture events in an attempt to prevent or resolve conflicts (Figure 5). Most captures were lone grizzly bears of all age classes, but two family groups (one female with two cubs-of-the-year and one female with two yearlings) were also captured. Twenty-four (47%) of the 51 capture events occurred in Park County, 16 (31%) in Sublette County, seven (14%) in Fremont County, two (4%) in Hot Springs County, and two (4%) in Teton County (Table 8).

Of the 51 capture events, 22 captures were a result of bears killing livestock (primarily cattle), six were captured for getting unsecured garbage and six were obtaining pet, livestock food, or foraging on fruit trees. Twelve management captures occurred as preemptive measures for bears exhibiting habituated behavior and/or being in close proximity to people, as well as three non-target captures and two captures for property damage. All relocated grizzly bears were released on U.S. Forest Service (USFS) lands in or adjacent to the Primary Conservation Area (PCA; Figure 6). Of the 34 relocation events, 17 (50%) bears were released in Park County, 16 (47%) were released in Teton County, and one (3%) was released in Fremont County (Table 8).

Sixteen of the 51 capture events resulted in the removal of grizzly bears from the population by Department personnel by lethal removal or live placement in a zoo. These bears were removed due to a history of previous conflicts, a known history of close association with humans, or they were deemed unsuitable for release into the wild (e.g. orphaned cubs, poor physical condition, or human safety concern).

All independent grizzly bears greater than 2-years-old that were relocated, were fitted with a radio-tracking collar to monitor their movements after release. Attempts to obtain locations on marked grizzly bears through aerial telemetry were made approximately every 10-14 days as part of standard monitoring techniques throughout the ecosystem. As per Wyoming Statute, within five days of releasing a grizzly bear, the County Sheriff was notified by e-mail and a press release was distributed to all local media contacts in the county where the grizzly bear was released. The media release contained information on the location of the grizzly bear release, the number of grizzly bears relocated, the date of the relocation, and the reason the grizzly bear was relocated (Table 8).

Remote cameras capture a grizzly bear feeding on a carcass.

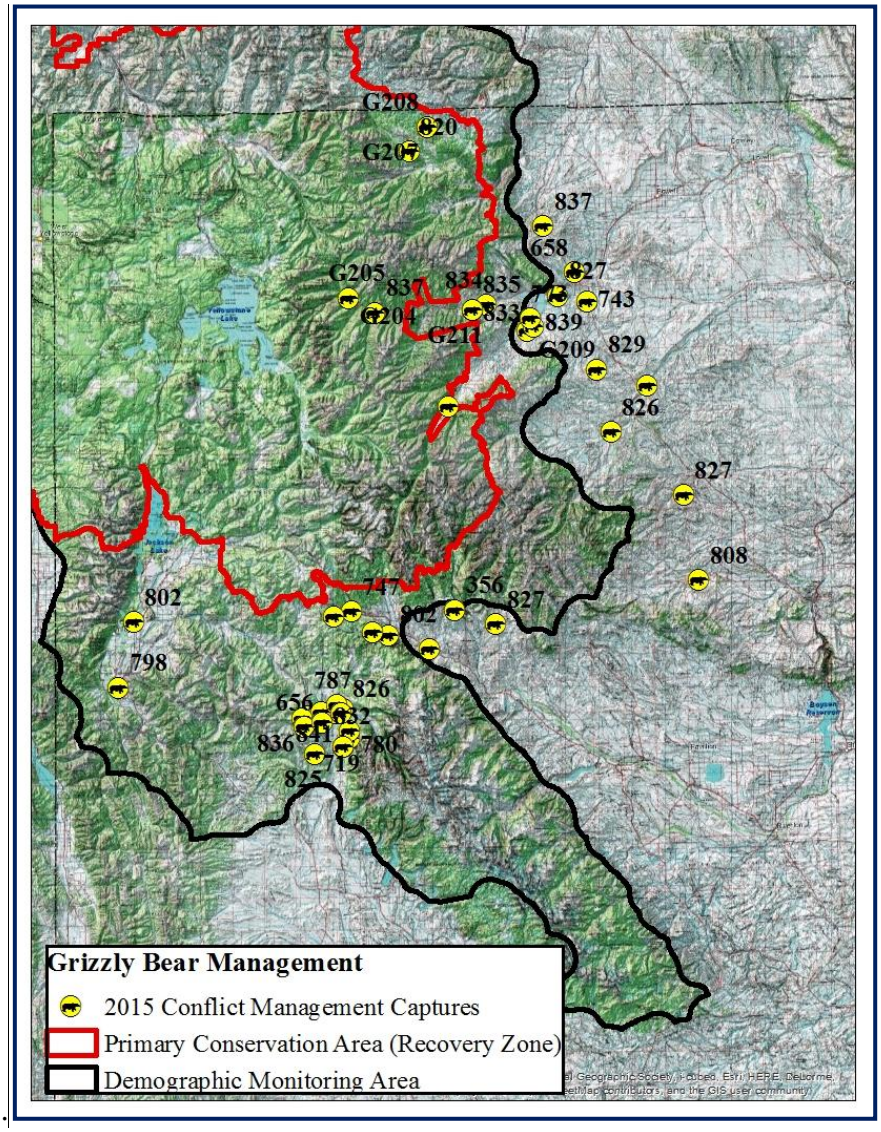


Figure 5. Management capture locations (n = 51) for grizzly bears captured, relocated, released, or removed in 2015. Grizzly bears with "G" in front of their number were ear-marked but not fitted with radio collars upon release typically because they were too young to be collared. Grizzly bears identified with "NA" were grizzly bears removed from the population without being given an identification number. PCA is the grizzly bear Primary Conservation Area as defined in the 2007 Grizzly Bear Conservation Strategy. DMA is the grizzly bear Demographic Monitoring Area as defined in "Interagency Grizzly Bear Study Team. 2012. Updating and Evaluating Approaches to estimate population size and sustainable mortality limits for grizzly bears in the Greater Yellowstone Ecosystem. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, MT, USA.

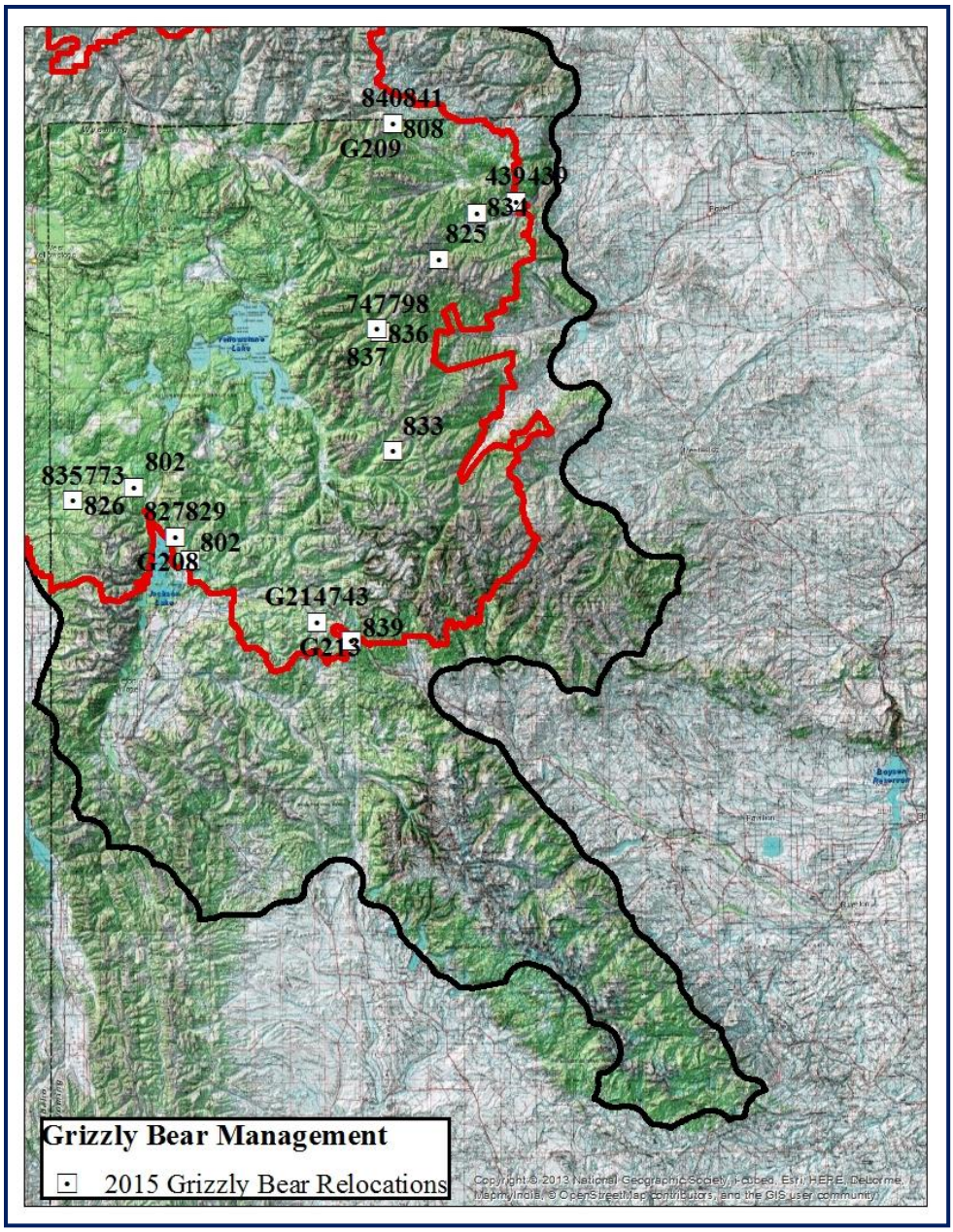


Figure 6. Release locations (n = 34) for grizzly bears captured, relocated, or released on site in conflict management efforts 2015. Grizzly bears with "G" in front of their number were ear-marked but not fitted with radio collars upon release typically because they were too young to be collared. PCA is the grizzly bear Primary Conservation Area as defined in the 2007 Grizzly Bear Conservation Strategy. DMA is the grizzly bear Demographic Monitoring Area as defined in "Interagency Grizzly Bear Study Team. 2012. Updating and Evaluating Approaches to estimate population size and sustainable mortality limits for grizzly bears in the Greater Yellowstone Ecosystem. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, MT, USA.

Table 8. Capture date, grizzly bear identification number (ID), capture county, relocation site, release county, and reason for capture for all 2015 grizzly bear conflict management captures (*n* = 51) in Wyoming. Grizzly bears identified with "NA" were grizzly bears removed from the population without being given an identification number.

Date	ID	Capture county	Relocation Site	Release County	Reason For Capture
4/17/2015	802	TETON	PILGRIM CREEK Bridger-Teton Forest	TETON	NON-TARGET CAPTURE
5/14/2015	808	HOT SPRINGS	FOX CREEK Shoshone Forest	PARK	RELOCATED FOR SHEEP DEPREDATION
5/14/2015	802	FREMONT	GLADE CREEK JDR Parkway	TETON	NON-TARGET CAPTURE
6/11/2015	G204	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR FREQUENTING GUEST LODGE
6/11/2015	G205	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR FREQUENTING GUEST LODGE
6/26/2015	656	SUBLETTE			REMOVED FOR CHRONIC CATTLE DEPREDATIONS
6/27/2015	NA	FREMONT			REMOVED FOR CHRONIC GARBAGE CONFLICTS
6/27/2015	G206	SUBLETTE	FIVE MILE CREEK Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATIONS
7/3/2015	356	FREMONT			REMOVED FOR CHRONIC GARBAGE CONFLICTS
7/12/2015	719	SUBLETTE			REMOVED FOR CATTLE DEPREDATIONS
7/25/2015	780	SUBLETTE			REMOVED FOR CATTLE DEPREDATIONS
7/25/2015	G207	PARK	BAILEY CREEK Bridger-Teton Forest	TETON	RELOCATED FOR FREQUENTING DEVELOPED AREA
7/25/2015	G208	PARK	BAILEY CREEK Bridger-Teton Forest	TETON	RELOCATED FOR FREQUENTING DEVELOPED AREA
8/2/2015	824	SUBLETTE	MORMON CREEK Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATIONS
8/3/2015	825	SUBLETTE	SUNLIGHT CREEK Shoshone Forest	PARK	RELOCATED FOR SHEEP DEPREDATIONS
8/7/2015	826	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR OBTAINING HORSE GRAIN

Date	ID	Capture county	Relocation Site	Release County	Reason For Capture
8/8/2015	NA	FREMONT			REMOVED FOR GARBAGE CONFICTS
8/8/2015	827	HOT SPRINGS	BAILEY CREEK Bridger-Teton Forest	TETON	RELOCATED FOR FREQUENTING DEVELOPED AREA
8/11/2015	NA	FREMONT			REMOVED FOR CHRONIC CATTLE DEPREDATIONS
8/13/2015	658	PARK			REMOVED FOR OBTAINING GARBAGE
8/20/2015	826	SUBLETTE			REMOVED FOR PROPERTY DAMAGE
8/20/2015	G209	PARK	FOX CREEK Shoshone Forest	PARK	RELOCATED FOR OBTAINING GARBAGE
8/21/2015	829	PARK	BAILEY CREEK Bridger-Teton Forest	TETON	RELOCATED FOR CATTLE DEPREDATION
8/24/2015	NA	PARK			REMOVED FOR LIVESTOCK DEPREDATION
8/29/2015	832	SUBLETTE	FIVE MILE Creek Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATION
9/1/2015	833	PARK	FOX CREEK Shoshone Forest	PARK	RELOCATED FOR DAMAGING APPLE TREES
9/2/2015	834	PARK	EAST PAINTER GULCH Shoshone Forest	PARK	NON-TARGET CAPTURE, RELOCATED
9/3/2015	835	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR DAMAGING APPLE TREES
9/3/2015	G210	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR DAMAGING APPLE TREES
9/3/2015	G211	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR DAMAGING APPLE TREES
9/6/2015	836	SUBLETTE	FIVE MILE CREEK Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATIONS
9/8/2015	827	FREMONT	MORMON CREEK Bridger-Teton Forest	PARK	RELOCATED FOR PIG DEPREDATIONS
9/9/2015	837	PARK	MORMON CREEK Bridger-Teton Forest	PARK	RELOCATED PRE-EMPTIVELY FROM DEVELOPED SITE
9/10/2015	439	SUBLETTE	ANTELOPE BUTTE Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATION

Date	ID	Capture county	Relocation Site	Release County	Reason For Capture
9/10/2015	G212	SUBLETTE	ANTELOPE BUTTE Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATION
9/11/2015	NA	SUBLETTE			CAPTURED FOR CATTLE DEPREDATION, ACCIDENTAL MORTALITY
9/11/2015	798	TETON	FIVE MILE CREEK Shoshone Forest	PARK	RELOCATED FOR DAMAGING APPLE TREES
9/13/2015	839	PARK	MOCCASIN BASIN Shoshone Forest	FREMONT	RELOCATED FOR KILLING CHICKENS AND DUCKS
9/16/2015	747	FREMONT	FIVE MILE CREEK Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATIONS
9/19/2015	832	SUBLETTE			REMOVED FOR CATTLE DEPREDATIONS
9/21/2015	773	PARK	SQUIRREL MEADOWS Bridger-Teton Forest	TETON	RELOCATED FOR OBTAINING GARBAGE
9/23/2015	837	PARK			REMOVED FOR CHRONIC HABITUATION
9/25/2015	787	SUBLETTE			REMOVED FOR CATTLE DEPREDATIONS
9/25/2015	840	SUBLETTE	FOX CREEK Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATIONS
9/26/2015	841	SUBLETTE	FOX CREEK Shoshone Forest	PARK	RELOCATED FOR CATTLE DEPREDATION
10/6/2015	NA	PARK			REMOVED FOR CHRONIC HABITUATION
10/17/2015	827	PARK			REMOVED FOR CHRONIC HABITUATION
10/22/2015	820	PARK			REMOVED FOR REPEATED PROPERTY DAMAGE
10/28/2015	743	PARK	SQUAW BASIN Bridger-Teton Forest	TETON	RELOCATED FROM CODY LANDFILL
10/30/2015	G213	PARK	SQUAW BASIN Bridger-Teton Forest	TETON	RELOCATED FROM CODY LANDFILL
10/30/2015	G214	PARK	SQUAW BASIN Bridger-Teton Forest	TETON	RELOCATED FROM CODY LANDFILL

CONFLICT MANAGEMENT – CONFLICT VERIFICATION AND REPORTING

Department personnel investigated and recorded 325 grizzly bear-human conflicts in 2015 (Table 9, Figure 7). As a result of numerous diligent education and conflict prevention efforts, the general pattern of conflicts is relatively steady within currently occupied habitat. However, grizzly bear distribution and conflicts continue to be observed in areas further from the Primary Conservation Area (also referred to as the Recovery Zone) and outside the current Demographic Monitoring Area (DMA), often on private lands (Figures 8 and 9). Bears are increasingly coming into conflict with people in areas not used by grizzly bears in recent history. Although the joint efforts of the Department, U.S. Forest Service (USFS), non-governmental organizations, and the public have resulted in reducing conflicts through education and attractant storage in many areas, numbers of grizzly bear conflicts in Wyoming were very high this year. Bears frequented lower elevations and developed areas regularly throughout the non-denning period. Cattle depredation was the most frequent type of grizzly bear conflict documented in 2015 (Table 9). The annual variation in livestock depredation incidents is not easily explained. Although most human-bear conflicts are correlated with natural food abundance, the number of cattle and sheep killed annually do not follow the same pattern. The Department continues to explore options to reduce grizzly bear livestock conflicts and work closely with producers to remain vigilant in regards to these types of conflicts and conflict resolution.

Table 9. Type and Number of Human-Grizzly Bear Conflicts in Wyoming, 2015.

Conflict Type	Number	Approx. percent (%)
Cattle	141	43.4%
Garbage	87	26.8%
Pet-Livestock-Birdfeeders	37	11.4%
Property damage	22	6.8%
Sheep	11	3.4%
Fruit trees	6	1.8%
Unsecured Attractants	5	1.5%
Animal Death	4	1.2%
Aggression Toward Humans	4	1.2%
Poultry	3	0.9%
Animal Injury	2	0.6%
Swine	1	0.3%
Beehive	1	0.3%
Human Injury	1	0.3%
Total	325	100%

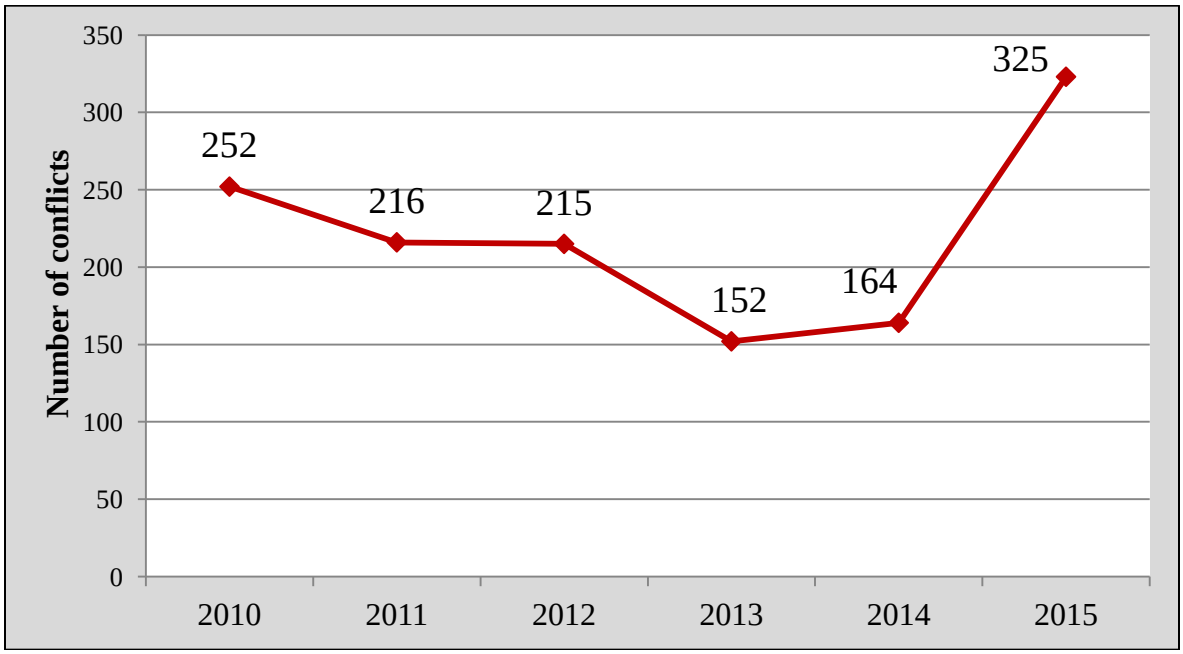


Figure 7. Number of Human-Grizzly Bear Conflicts documented in Wyoming, 2010 - 2015.

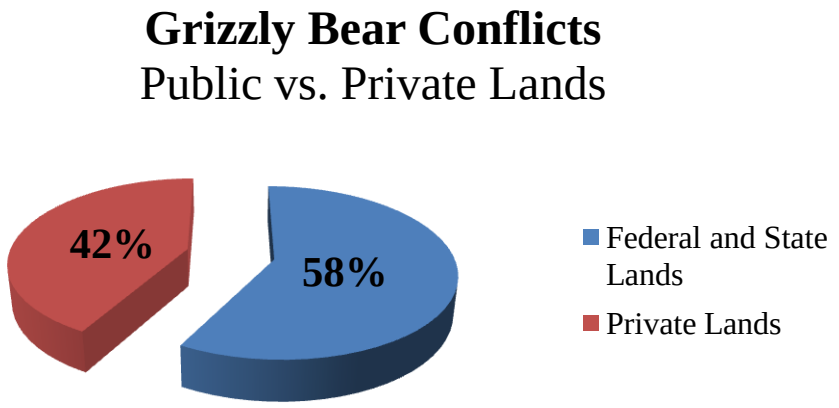


Figure 8. Number of Human-Grizzly Bear Conflicts on Private and Public Lands in Wyoming, 2015.

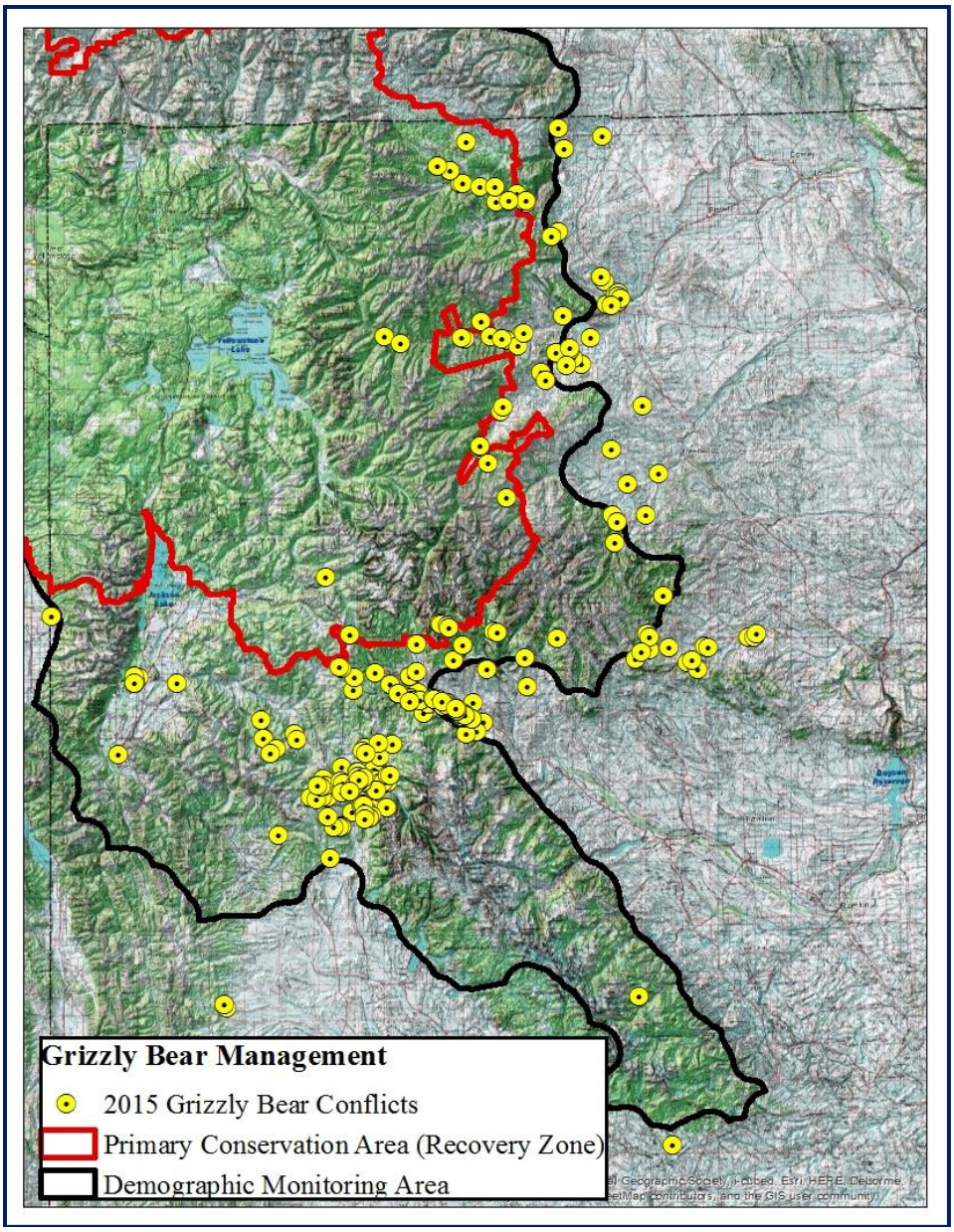


Figure 9. Location of human-grizzly bear conflicts in Wyoming outside of National Parks (*n* = 325) in relation to the Primary Conservation Area and the Demographic Monitoring Area, Wyoming, 2015.

MONITORING AND CONFLICT MANAGEMENT – GRIZZLY BEAR MORTALITIES

Within Wyoming, outside of the National Parks and Wind River Reservation, there were 33 known or probable human-caused mortalities in 2015. Management removals accounted for 16 mortalities in 2015. Of the 16 grizzly bears removed in management actions, seven were removed due to livestock depredations and nine due to property damage or human food rewards and exhibiting unnaturally bold behavior in close proximity to humans. In addition to the 16 management removals, one died of unknown causes, one died from capture myopathy, five died of natural causes and 10 mortalities are under investigation by law enforcement.

Most grizzly bear-human conflicts in Wyoming were a result of domestic livestock depredations and food rewards from humans in the form of garbage or pet and livestock feed. Long-term trends in the number of conflicts is likely a result of grizzly bears increasing in numbers and distribution and expanding into areas used by humans, including livestock production, on public and private lands. As the GYE grizzly bear population continues to grow and expand in distribution, bears encounter food sources such as livestock and livestock feed, garbage, and pet food resulting in increased property damage and threats to human safety. Conflict prevention measures such as attractant storage, deterrence, and education remain a high priority for the Department.

In general, there is an inverse relationship between social tolerance and biological suitability for bear occupancy in areas further from the original recovery zone due to human development, land use patterns, and various forms of recreation. Although prevention is the preferred option to reduce conflicts, each situation is managed on a case-by-case basis with education, securing of attractants, relocation or removal of individual bears, or a combination of methods used for long term conflict resolution.

Sam Stephens prepares to relocate a grizzly bear.

2015 BEAR WISE WYOMING UPDATE

Introduction

The Bear Wise Wyoming Program is a proactive initiative that seeks to minimize human-bear (black and grizzly) conflicts, minimize management-related bear mortalities associated with preventable conflicts, and to safeguard human communities in northwest Wyoming. The overall objective of the Bear Wise Wyoming Program is to promote individual and community ownership of ever-increasing human-bear conflict issues, moving toward creating a social conscience regarding responsible attractant management and behavior in bear habitat. This project seeks to raise awareness and proactively influence local waste management infrastructures with the specific intent of preventing conflicts from recurring. Strategies used to meet the Bear Wise Wyoming Program's objectives are: 1) minimize accessibility of unnatural attractants to bears in developed areas; 2) employ a public outreach and education campaign to reduce knowledge gaps about bears and the causes of conflicts; and 3) employ a bear resistant waste management system and promote bear-resistant waste management infrastructure.

This report provides a summary of program accomplishments in 2015. Past accomplishments are reported in the IGBST's 2006 - 2014 annual reports and the Department's 2011-2014 Annual Job Completion Reports.

Background

In 2004, a subcommittee of the IGBST conducted an analysis of causes and spatial distribution of grizzly bear mortalities and conflicts in the GYE for the period of 1994–2003. The analysis identified that the majority of known, human-caused grizzly bear mortalities occurred due to agency management actions in response to conflicts (34%); self defense killings, primarily by big game hunters (20%); and vandal killings (11%). The report made 33 recommendations to reduce human-grizzly bear conflicts and mortalities with focus on three actions that could be positively influenced by agency resources and personnel: 1) reduce conflicts at developed sites; 2) reduce self-defense killings; and 3) reduce vandal killings (Servheen et al. 2004).

To address action 1, the subcommittee recommended that a demonstration area be established to focus proactive, innovative, and enhanced management strategies where developed site conflicts and agency management actions resulting in relocation or removal of grizzly bears had historically been high. Spatial examination of conflicts identified the Wapiti area in northwest Wyoming as having one of the highest concentrations of black bear and grizzly bear conflicts in the GYE. The North Fork of the Shoshone River west of Cody was then chosen as the first area composed primarily of private land to have a multi-agency/public approach to reducing conflicts at developed sites.

In 2005, the Department began implementation of the Bear Wise Community Program. Although the program's efforts were focused primarily in the Wapiti area, the Department initiated a smaller scale project in Teton County to address the increasing number of black and grizzly bear conflicts in the Jackson, Wyoming area. For the last nine years, the Bear Wise Community Programs in both Cody and Jackson have deployed a multi-faceted education and outreach

campaign in an effort to minimize human-bear conflicts and promote proper attractant management. Although a wide array of challenges remain and vary between communities, many accomplishments have been made and progress is expected to continue as Bear Wise efforts gain momentum. In an effort to broaden the scope of the program, this work was rebranded as the Bear Wise Wyoming Program to reference the work done on a broader scale across the state and beyond, however regional efforts are still referred to as Bear Wise Community Programs in this document.

Wapiti Project Update

The Wapiti Bear Wise Community Program continues to utilize radio, television and print media, mass mailings, and the use of signing on private and public land to convey the educational messages surrounding human-bear conflict prevention. Conflict prevention information is also disseminated through public workshops and presentations and by contact with local community groups, governments, the public school system, and various youth organizations. To compliment educational initiatives, the program uses an extensive outreach campaign that assists the community in obtaining and utilizing bear-resistant products and implementing other practical methods of attractant management. Ongoing efforts and new accomplishments for 2015 are as follows:

The Carcass Management Program continues to provide a domestic livestock carcass removal service for livestock producers located in occupied grizzly bear habitat within Park County, Wyoming. The program has been traditionally funded by the Park County Predator Management District and Wyoming Animal Damage Management Board. In addition to those donors, the program received contributions from Park County Commissioners, Wyoming Outdoorsmen, and the Memorial Bear Fund. The program provides livestock producers and owners with an alternative to the use of on-site carcass dumps, which are a significant bear attractant and indirectly contribute to numerous human-bear conflicts. Since June 2008, 755 domestic livestock carcasses have been removed from private lands. This year an article was published in the International Bear News discussing the efficacy of the program.

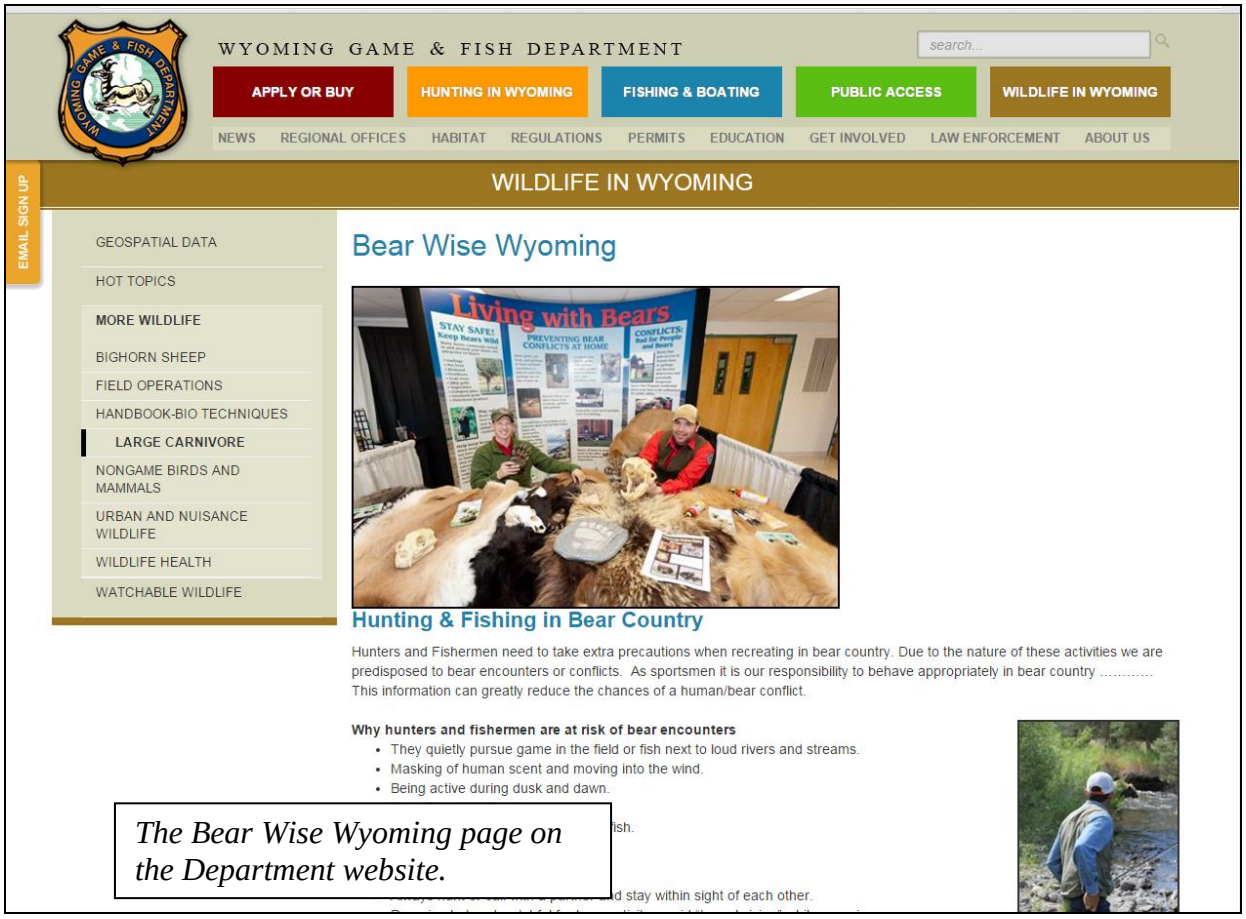
Recommendations concerning the proper storage of garbage and other attractants are provided to the Park County Planning and Zoning Commission for new developments within the greater Cody area. The Bear Wise Coordinator reviews proposed developments on a case-by-case basis, attends monthly meetings, and contacts applicants directly to discuss conflict prevention measures. To date, these comments have been adopted as either formal recommendations or as a condition of approval for 19 new developments within Park County.

This year, with grants from the Wyoming Outdoorsmen and Yellowstone Country Bear Hunters Association, the Department was able to purchase 100 cans of bear spray to be distributed to sportsmen. The bear spray was handed out at the Department's Cody hunter check station, and all cans were distributed in under an hour. Sportsmen where asked to voluntarily fill out a short survey to gather a better understanding of how the Bear Wise Wyoming program can better meet constituent needs.

Bear Wise Wyoming Coordinator Dusty Lasseter at the bear spray giveaway in Cody, Wyoming

The Department's partnership with the North Fork Bear Wise Group (NFBWG) continues to grow. The group is comprised of six local Wapiti citizens that meet monthly in order to articulate community needs and assist in the development of educational and outreach initiatives. The group met once a month for six months (during active bear season) and were instrumental in coming up with ideas on how to reduce human-bear conflicts.

In conjunction with the Department developing a new website for hunters and fishermen, LCS personnel were able to create a Bear Wise Wyoming page to better educate both resident and non-resident sportsmen and recreationists. In the future this platform will be a key place to direct citizens who have questions about staying safe in bear country. https://wgfd.wyo.gov/Wildlife-in-Wyoming/More-Wildlife/Large-Carnivore/Grizzly-Bear-Management/Bear-Wise-Wyoming



The Bear Wise Wyoming page on the Department website.

Educational black bear/grizzly bear identification materials were distributed to individuals and local sporting goods stores in the Cody, Pinedale, and Lander areas, and mailed to black bear hunters who registered bait sites with the Department in areas surrounding the GYE. Other efforts in the Wapiti/Cody area included:

- Numerous informational presentations focused on human-bear conflict prevention to audiences including the Park, Fremont, Hot Springs, and Big Horn County public school systems, homeowners associations, Boy Scouts, 4-H members,, Paint Rock Hunter Management Program, guest ranches, and college students. Frequent one-on-one contacts were made during the 2015 conflict season in areas where the occurrence of human-bear conflicts has historically been high.

- A "Working Safely in Bear Country" workshop was conducted for the Park County Weed and Pest District, Bureau of Land Management (BLM), Black Hills Energy, and the British Broadcasting Corporation (BBC).

- A booth containing information on bear identification, attractant storage, hunting and recreating safely in bear country, and the proper use of bear spray was staffed at the Lander Winter Fair, Cody Arbor Day, Dubois Museum Days, Lander Outdoor Expo, and Wyoming Outdoorsmen Banquet.

- By utilizing the bear trailer, booths, workshops, and giving approximately 50 presentations, the Bear Wise Wyoming Program directly reached approximately 4,250 people in the Cody Region.

- The Department gave two interpretative hikes up the Elk Fork River on the Shoshone National Forest to discuss the ecology, management, and conservation of the Yellowstone grizzly bear for the annual Cody Chamber of Commerce sponsored "Spring Into Yellowstone". These tours took approximately five hours and a good deal of bear sign was identified on the tour.

- A public service announcement (PSA) was recorded by Department personnel on "Staying Safe in Bear Country" and broadcast over the radio in the spring and fall of 2015 on the Bighorn Basin Radio Network.

- In the Cody Region, LCS personnel met with local producers and landowners to minimize conflicts. Personnel erected 19 temporary electric fences around bee apiaries, and several electric fences around apple orchards to deter bears.

Electric fencing around a bee apiary in Park County, Wyoming.

- In the spring, LCS personnel put on 13 "Living in Large Carnivore Country" workshops across Wyoming. The objective of these workshops is to reach out to the public and give them the opportunity to learn how to live with bears, mountain lions, and wolves. In 2015 we gave presentations and hands on demonstrations to ~ 250 attendees.

Pinedale Area Update

In 2011, a Bear Wise Community Program was initiated targeting residential areas north of Pinedale, Wyoming where the occurrence of human-bear conflict has increased in recent years. A portion of the highlighted accomplishments for the Pinedale area in 2015 includes:

- As bears have expanded, increased efforts have occurred to educate the public about bear ecology, management, and safety. Bear safety presentations were given to the Boy Scouts of America at "Camp New Fork", and to cowboys and sheepherders of multiple grazing associations in the Region. The following entities also received bear safety presentations: Sublette County Chamber of Commerce and Sublette County Visitor's Center, USFS Pinedale and Big Piney Ranger Districts, Pinedale BLM, Sublette County Weed and Pest workers and volunteers, Red Cliff Bible Camp.

- Specific "Hunting in Bear Country" presentations were given to hunter safety classes throughout the Region.

- The Department secured donated materials to construct bear resistant meat storage poles. The Big Piney Ranger District erected four sets of meat poles in 2015 with the donated materials. This continues to be an area of interest to increase this infrastructure.

- The Department hosted a bear safety booth at Pinedale's Rendezvous Days Celebration over a three day period in July of 2015. Pinedale's Rendezvous Days attracts approximately 10,000 people over the four day event and Department employees contact an estimated 1,000 constituents.

- The Department hosted a bear safety booth at the Cora Rural Fire Department's annual picnic and celebration, contacting dozens of homeowners that live and recreate in occupied grizzly bear habitat.

- We participated in a Department "Day in the Park" meeting and educating locals and tourists on bear education in the Pinedale Town Park.

Objectives for 2016 include continued expansion of the program into the other areas of the state where human-bear conflicts continue to be a chronic issue and the continuation of current educational and outreach efforts in the Cody area with specific focus on areas that have not adopted proper attractant management methods. The Department is also working to assist the USFS with providing bear proof storage containers and meatpoles at targeted areas in the Pinedale Region.

The Wapiti and Pinedale area Bear Wise Programs face the ongoing challenges of: 1) the absence of ordinances, regulations, or laws prohibiting the feeding of bears; 2) limited

educational opportunities and contact with portions of the community due to a large number of summer-only residents and the lack of organized community groups and; 3) decreased public tolerance for grizzly bears due to record numbers of human-bear conflicts and continued federal legal protection. The future success of the Bear Wise Wyoming Program lies in continued community interest and individual participation in proper attractant management.

Jackson Hole Area Update

The Bear Wise Jackson Hole Program continues educational and outreach initiatives to minimize human-bear conflicts within the community of Jackson and surrounding areas. In 2015, the program's public outreach and educational efforts included the use of signage, public workshops and presentations, distribution of informational pamphlets, promoting awareness about bear spray, carcass and fruit tree management, and utilizing our bear education trailer.

A bear education trailer was purchased in August 2010 with funding from the Department, Grand Teton National Park, Bridger-Teton National Forest, and Jackson Hole Wildlife Foundation. Two bear mounts (1 grizzly bear and 1 black bear) have been placed in the trailer along with other educational materials. The bear mounts were donated to the Department through a partnership with the United States Taxidermist Association and the Center for Wildlife Information. The trailer was displayed and staffed at various events and locations including Grand Teton National Park, Jackson Elk Fest, Fourth of July Parade, and the National Elk Refuge Visitor Center. The following comprises some of the highlights from 2015:

- Public service announcements were broadcast on four local radio stations in Jackson for a total of six weeks throughout the spring, summer and fall of 2015. The announcements focused on storing attractants so they are unavailable to bears and hunting safely in bear country.

- Numerous educational talks were presented to various groups including homeowner's associations, guest ranches, youth camps, Jackson residents, tourists, school groups, and Teton County employees.

- Door flyers with detailed information about attractant storage and bear conflict avoidance were distributed in two Teton County residential areas where high levels of bear/human conflicts were occurring.

- A considerable amount of time was spent removing ungulate and livestock carcasses from residential areas and ranches in the Jackson Region. Recommendations were made to a north Jackson home owner's association about fruit tree management and installing bear resistant infrastructure in their subdivision.

- Spanish language bear informational pamphlets were distributed to Spanish speaking residents in Teton County with the help of the Teton County Latino Resource Center, Teton Literacy Center, and the Jackson Visitor Center.

- Refrigerator magnets featuring tips about proper attractant management were distributed to Teton Village homeowners, Aspens Property Management, and Jackson Hole Mountain Resort lodging.

- Numerous personal contacts were made with private residents in Teton County. This has proven to be a useful way to establish working relationships with residents and maintain an exchange of information about bear activity in the area. A booth containing information on bear identification, attractant storage, hunting and recreating safely in bear country, and the proper use of bear spray was staffed at the Jackson Hole Antler Auction and Kids Fishing Day.

- Assisted multiple hunting outfitters and with the installation and maintenance of electric fence systems around their field camps and located in the Bridger-Teton National Forest.

- Assisted Teton County Transfer Station staff with the installation and maintenance of an electric fence enclosure around their dead animal pit.

Mike Boyce installs electric fence to resolve bear conflicts at the Teton County Transfer Station.

- Signage detailing information on hunting safely in bear country, bear identification, recent bear activity, and proper attractant storage were placed at USFS trailheads and in private residential areas throughout Teton County.

- Consultations were conducted at multiple businesses and residences where recommendations were made regarding sanitation infrastructure and compliance with the Bear Conflict Mitigation and Prevention Land Development Regulations (LDR).

- Bear Aware educational materials were distributed to campground hosts in the Caribou-Targhee National Forest, hunters, and numerous residents in Teton County.

- Several radio and newspaper interviews were conducted regarding conflict prevention in the Jackson area.

- Educational black bear/grizzly bear identification materials were distributed to black bear hunters who registered bait sites with the Department in the Jackson Region.

- Worked with Jackson sanitation companies on researching and purchasing new bear resistant trash cans.

- Worked with the Jackson Hole Wildlife Foundation on designing and installing an educational billboard located near Wilson on Wyoming Highway 22.

Objectives for the Bear Wise Jackson Hole Program in 2016 will be focused on supporting Teton County and local waste management companies with projects that will help disseminate information and achieve compliance with the recently adopted Teton County Bear Conflict Mitigation and Prevention LDR. In addition, more work will be done to identify areas within the city limits of Jackson and Star Valley communities where better attractant management and sanitation infrastructure is needed.

The recent implementation of the Teton County Bear Conflict Mitigation and Prevention LDR has greatly reduced the amount of available attractants on the landscape and is a tremendous step forward for the Bear Wise Jackson Hole Program. The new challenges faced by the Department will be achieving full compliance with this regulation, even in years with low conflict when it may appear that the conflict issues are resolved. The Bear Wise Jackson Hole Program will convey the importance of compliance and strive to maintain public support for the LDR through public outreach and education projects. In order for the Bear Wise Jackson Hole Program to be successful, the program must continually identify information and education needs within the community while being adaptive to changing situations across different geographic areas. This will require the Department to coordinate with other government agencies and local non-government organizations working across multiple jurisdictions to develop a uniform and consistent message. If this level of coordination is achieved, the Department will be more effective in gaining support and building enthusiasm for the Bear Wise Jackson Hole Program, directing resources to priority areas, and reaching all demographics.

ADDITIONAL INFORMATION AND EDUCATION EFFORTS

In addition to the standard duties by the LCS through the Bear Wise Wyoming Program, multiple avenues of outreach and education occur throughout Wyoming and across the world-wide-web**.**

In working with Departmental personnel in Cheyenne, there has been a great deal of effort to update and incorporate messages regarding grizzly bear ecology, management and safety into the Department website. The grizzly bear management web page continues to be maintained and updated on a regular basis to provide timely information to the public regarding grizzly bear management activities conducted by the Department. Web page content includes various interagency annual reports and updates and links to other grizzly bear recovery web sites. Beginning May 2015, weekly updates of ongoing management activities related to depredations, research, trapping and monitoring, and information and education were posted to the Department's website. A total of 24 weekly updates were posted from May 2, 2015 through October 24, 2015. A monthly update of the activities of the LCS is posted on the webpage, as well as various reports and publications pertinent to grizzly bear ecology and management in Wyoming. In addition, personnel issued multiple educational news releases throughout the year informing readers and listeners of bear safety, behavior, conflict avoidance, food storage and natural food availability. For information specific to the Department's grizzly bear management program; including links to publications, reports, updates, and plan visit: https://wgfd.wyo.gov/web2011/wildlife-1000674.aspx

Hunter Education is a vital component toward the mission of the Department. Every hunter education class in Wyoming is required to discuss how to hunt safely in bear country. To assist instructors, the Department has provided inert bear spray canisters for demonstration purposes and DVD's entitled "Staying Safe in Bear Country, A Behavioral Based Approach to Reducing Risk". A section on bear safety is included in the student manual. Approximately 5,000 students are certified each year.

For additional information about the Bear Wise Wyoming Program contact:

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